

**"THE EXPERT"**

tape  
to  
disk



**SYSTEM**

**TRILOGIC B'fd.**  
**0274-684289**

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PLEASE READ THIS INSTRUCTION BOOKLET THOROUGHLY BEFORE USING THE EXPERT CARTRIDGE.

TURN OFF THE COMPUTER BEFORE INSERTING THE CARTRIDGE.

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THE EXPERT CARTRIDGE. TAPE TO DISK SYSTEM.

INTRODUCTION.

THE EXPERT SYSTEM IS A CARTRIDGE BASED TAPE TO DISK AND DISK TO DISK TRANSFER SYSTEM. MOST MACHINE RESIDENT PROGRAMS CAN BE TRANSFERRED TO DISK AT THE PRESS OF A KEY. IT IS BOTH EFFECTIVE & EASY TO USE, AND MORE ADVANCED USERS WILL FIND THE POWERFUL MACHINE-CODE MONITOR VERY HELPFUL.

THE EXPERT CARTRIDGE TAPE TO DISK SYSTEM COMPRISES A RAM CARTRIDGE WHICH IS FITTED WITH A THREE POSITION SWITCH, MARKED "PRG" "OFF" "ON" AND A RESET BUTTON.

A DISK IS SUPPLIED (referred to as the EXPERT disk from now on), WHICH HOLDS THE SYSTEM OPERATING PROGRAM. THIS PROGRAM IS FIRST LOADED INTO THE CARTRIDGE, THE PROGRAM TO BE TRANSFERRED IS LOADED AND RUN, AND THEN THE EXPERT CARTRIDGE IS ACTIVATED BY PRESSING THE RESTORE KEY WHEN YOU WANT TO STOP & SAVE THE PROGRAM.

THE PROGRAMS YOU HAVE TRANSFERRED FROM TAPE OR FROM ANOTHER DISK ARE STORED ON A LIBRARY DISK. A FAST LOADER "BOOT" PROGRAM IS COPIED ON TO EACH LIBRARY DISK SO THAT MOST GAMES WILL LOAD BACK & RUN IN WELL UNDER 30 SECONDS.

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## STEP BY STEP USER GUIDE.

### SECTION 1. PREPARING A LIBRARY DISK FOR TRANSFERRED PROGRAMS.

- 1) PREPARE A NEW DISK BY NEWING IT IN THE USUAL WAY. WE WILL CALL THIS DISK THE LIBRARY DISK FROM NOW ON.

To new a disk type OPEN 15,8,15,"N:NAME,XY" where NAME & XY are chosen by you to identify that particular disk.

- 2) COPY THE FILE CALLED "BOOT" FROM THE EXPERT DISK ONTO YOUR LIBRARY DISK.

Insert the EXPERT disk and type           LOAD"BOOT",8  
Now insert your library disk and type   SAVE"BOOT",8

NB           This is a fast loader directory file & MUST be the FIRST file on any disk you are using for storing programs.)

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### SECTION 2. SETTING UP THE COMPUTER READY FOR SAVING OUT A PROGRAM TO DISK.

- 3) SWITCH OFF THE COMPUTER & INSERT THE CARTRIDGE WITH THE SWITCH IN THE 'PRG.' POSITION AND TURN ON THE COMPUTER.
- 4) INSERT THE EXPERT DISK INTO THE DRIVE.
- 5) TYPE LOAD"PRG\*",8,1  
This loads the cartridge ram with the operating software.
- 6) NOW FOLLOW THE ON-SCREEN INSTRUCTIONS.
- 7) TYPE N AND PRESS RETURN.

The screen may now fill with characters (usually "@" ) and then the computer will reset back to the start-up screen ready for you to load the program you wish to freeze and save to disk.

- 8) THE COMPUTER IS NOW INITIALISED READY FOR YOU TO LOAD AND RUN THE PROGRAM YOU WISH TO SAVE.
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### SECTION 3. FREEZING AND SAVING YOUR PROGRAM.

- 9) NOW LOAD AND RUN THE PROGRAM YOU WISH TO SAVE TO DISK.

Ensure that your library disk is in the drive.  
See section 5 if you encounter any problems.

- 10) TAP THE RESTORE KEY GENTLY ONCE ONLY TO HALT THE GAME OR OTHER PROGRAM YOU WISH TO SAVE.

The screen will now clear and the DOT prompt (.) will appear near the top left corner. On the top line, the program restart address is displayed ( see .R in part 3, section 7).  
The EXPERT Cartridge is now active.  
More advanced users should see SECTION 7 on how to use the powerful monitor.

- 11) TYPE Z "ANY NAME" THEN PRESS RETURN.

Where "ANY NAME" is the name you should give to the program that you are saving.

- 12) THE PROGRAM WILL NOW BE SAVED TO DISK. WAIT UNTIL THIS HAS FINISHED,

It may take up to 3mins, depending upon the size of the program. The DOT PROMPT will then reappear. Do not touch the keyboard until then. In the top left corner, the last address saved will be shown (see note 5).

- 13) YOU CAN NOW REPEAT THE PROCESS FROM STEP 3, SAVING MORE PROGRAMS UNTIL YOUR LIBRARY DISK IS FULL.
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### SECTION 4. LOADING BACK PROGRAMS FROM DISK.

#### THE CARTRIDGE IS NOT REQUIRED.

THERE IS NO NEED TO UNPLUG IT, JUST TURN THE SWITCH TO 'OFF'.

- 14) INSERT YOUR LIBRARY DISK AND TYPE LOAD"BOOT",8 THEN TYPE RUN WHEN IT HAS FINISHED LOADING.
- 15) A LIST OF THE PROGRAMS ON YOUR DISK WILL NOW BE DISPLAYED. USE THE CURSOR DOWN KEY OR JOYSTICK TO SELECT THE PROGRAM YOU WISH TO LOAD, AND PRESS RETURN OR 'FIRE'.
- 16) YOU WILL NOW BE AMAZED AT THE SPEED WITH WHICH ANY PROGRAM WILL LOAD.

NB When the disk drive stops, it can take several seconds for the program to be reorganised ('uncrunched') and start running, so please wait.

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## SECTION 5. PROBLEMS

- 1) PLEASE DO NOT EXPECT THE EXPERT SYSTEM TO BE ABLE TO TRANSFER EVERY PROGRAM. SOFTWARE UPGRADES WILL BE AVAILABLE IN DUE COURSE WHICH WILL INCREASE THE NUMBER OF PROGRAMS HANDLED BY THE SYSTEM.
- 2) Some programs will not run if a disk drive is connected although they will load normally. If this happens, switch off the drive until you are ready to save the program, ie just prior to typing Z (step 11).
- 3) Some programs generate NMIs which activate the cartridge unexpectedly. By leaving the switch in the off position until just prior to pressing the RESTORE key to stop the program, this problem can be overcome in most cases.

NB. The dot prompt replaces the normal C64 flashing cursor when the EXPERT Cartridge is active. It also shows that the monitor commands are functional.

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## SECTION 6. FURTHER EXPLANATIONS.

- 1) The "BOOT" file is the program which FAST LOADS back any of the programs you have saved. It also generates the menu of programs on the disk, and saves you having to list the directory and type LOAD etc.
  - 2) You can restart a program from where you stopped it by typing R (from within the monitor, ie the dot prompt will be present) followed by RETURN. Alternately pressing R Return & the RESTORE key, will enable you to step through the program. Press Z "ANY NAME" followed by Return when you wish to start saving and then carry on from step 12. The R command restarts the program from the address which is displayed when you pressed the RESTORE key to stop the program.
  - 3) Programs are saved in a "crunched" or compacted form in one file. You will therefore be able to store several programs on one disk.
  - 4) Your existing disk based programs can be transferred to a new disk by this system to reduce loading times.
  - 5) Knowing the last address saved is useful because it enables you to manually save the program should the Z command fail for example because your disk was full. Just save the memory from \$0801 to the end address shown (the S command can be used).
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## SECTION 7. THE MACHINE CODE MONITOR.

### INTRODUCTION.

The Monitor software, which is part of the EXPERT CARTRIDGE TAPE TO DISK SYSTEM is a very powerful tool with several unique features. The Monitor is completely invisible to the user and can be used over the whole of the 64K ram. The syntax will be familiar to anyone who has used a Commodore machine-code Monitor.

To get into the monitor at any time, simply tap the RESTORE key, assuming that you have carried out steps 3 to 6 in section 2 first. This is a very useful facility in its own right for machine-code programmers.

### MONITOR COMMANDS.

ALL THE COMMANDS FOLLOW THE DOT PROMPT (.) WHICH WILL APPEAR WHENEVER THE MONITOR IS IN OPERATION.

TYPE THE COMMAND FOLLOWED ONE OR MORE PARAMETERS, WHICH WILL BE AN ADDRESS (in hex) IN MOST CASES. A ? WILL APPEAR IF YOU TRY TO OMIT THE PARAMETER.

EACH COMMAND IS FOLLOWED BY AN EXAMPLE. HEXADECIMAL NOTATION IS USED.

<u>COMMAND</u>	<u>PARAMETER(S)</u>	<u>FUNCTION</u>
----------------	---------------------	-----------------

- |  |                        |
|--|------------------------|
| .A 1000 LDX \$00   | <u>ASSEMBLES</u>       |
| Starts assembly at \$1000. in this example the X register is loaded with the value in location \$00. You will then be prompted for the next instruction address. Press RETURN to terminate the assembly. |                        |
| .D 1000.   | <u>DISASSEMBLES</u>    |
| Disassembles one line of code starting from location \$1000. (If you omit the final . the disassembly will continue until you press either the STOP key or use the space bar to pause it).               |                        |
| .D 1000 2000   | <u>DISASSEMBLES</u>    |
| As above but disassembles code from location \$1000 to location \$2000.  |                        |
| .F 1000 2000 XY  | <u>FILLS</u>           |
| Fills memory from \$1000 to \$2000 with a value, where XY can be any number from \$00 to \$FF.   |                        |
| .G 1000  | <u>GOES TO (JUMPS)</u> |
| Starts executing a program from location \$1000.   |                        |
| .H 1000 2000 A9 00   | <u>HUNTS</u>           |
| Hunts through the memory between \$1000 & \$2000 for the two consecutive bytes A9 00 and displays the addresses if any where they were found.  |                        |
| .H 1000 2000 'hello  | <u>HUNTS</u>           |
| Hunts between \$1000 & \$2000 for text string "hello" (in ASCII) and displays the addresses if found.  |                        |

.I see M

.L "PROGRAM NAME" 08 LOADS  
Loads a program from device 8 (disk) to the address from where it was saved.

.L "PROGRAM NAME" 08 2000 LOADS  
Loads a program from device 8 to memory commencing from location \$2000.

.M 1000. MODIFIES  
Displays the contents of one line of memory (8 consecutive locations) starting at address \$1000, with the ASCII form on the right of the screen. You can alter the contents of any location with this command. Use the cursor keys to locate the byte you wish to overwrite. Enter the new value and press return. The new value will appear in place of the old one unless you are trying to "poke" into a ROM location when the old value will reappear. If you omit the final . the listing will continue until you press the STOP key or pause the scrolling with the space bar.

.M 1000 2000 MODIFIES  
As above but displays all memory between \$1000 & \$2000. Use the space bar to halt the scrolling.

N SPECIAL  
Fills ALL 64k ram with the current fill byte which was specified in section 2 step 7. If no value was specified initially then the default value is \$00, otherwise it is the last value used.

.R RESTARTS  
Restarts the program you halted by tapping the RESTORE key. The restart address is displayed when the RESTORE key is pressed to stop the program.

.S "PROGRAM NAME" 08 1000 2000 3000 SAVES  
Saves memory from \$1000 to \$2000 to device 8 (disk) so that it loads back at \$3000. If you omit the last address the program will load back from where it was saved.

V "PROGRAM NAME" 08 VERIFIES  
Verifies a program on disk with that in the ram and lists the addresses where there is a difference.

.W WARM START  
Causes a warm start similar to pressing RUN/STOP RESTORE. Used to return to BASIC.

.X EXCHANGES  
Toggling this key exchanges the two C64 memory maps that the monitor is currently working in. 00 indicates all 64k ram is accessible and FF indicates that the normal CBM64 default map is selected.

.Z "PROGRAM NAME"

Saves the program in a crunched or compacted form on disk and displays the end address saved. This is the "TAPE TO DISK COMMAND".

.!

Displays the restart address. ie this is the next address which would have been executed had the program not been stopped.

./ 1000

Alters the restart address, in this case to \$1000.

.@

Reads the disk error channel.

.\*N:DISKNAME,XY

The @ command is equivalent to typing OPEN15,8,15,"  
All the other DOS commands can be used in this way.

.\*# PROGRAM NAME

Displays the start and end addresses of the program.

.\*\$

Lists the directory to the screen without corrupting memory.

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## NOTES FOR USING THE MONITOR.

### 1) .R

This can be used to find the ideal point from which to save a program. You alternately press R and Restore to step through until you find the best place to start saving the program.

### 2) .X

Memory map 00 consists of the entire 64k ram, and the Monitor works in this map at the instant you press the restore key. Thus you can alter or "look at" all of the computers ram from \$0000 to \$FFFF. Any changes to \$0000 or \$0001 will have no effect because a copy of these is kept elsewhere; (they select which map the monitor is working in).

Memory map FF which the monitor can access if you toggle the X key, is as follows:-

\$0000 TO \$9FFF	RAM.
\$A000 TO \$BFFF	BASIC ROM
\$C000 TO \$D7FF	RAM
\$D800 TO \$DBFF	COLOUR RAM
\$DC00 TO \$DCFF	PARAMETER BLOCK
\$E000 TO \$FFFF	KERNAL ROM

The memory from \$DC00 to \$DCFF in map XFF is used by the .R command to store various parameters.

### 3) .Z (THE TAPE TO DISK COMMAND)

This command saves a compacted version of your program in ONE file. This file contains all the information needed to restart the program without the cartridge being required for loading back.

### 4) ./

If you have a program which is started by using the SYS command, for example SYS32768 it is preferable to just load the program and NOT run it. When it has loaded, clear the screen and tap the RESTORE key to enter the monitor. Then change the sys number into hexadecimal and then type this number after the / command.

eg program was started by typing     SYS4096.

so:-

1) Convert 4096 to hex = \$1000.

2) So change restart address to \$1000 by typing   /1000

You can check that you have got the restart address correct by using the restart command R and then altering it as necessary with the / command until you get the program to run from exactly where you want it to. When you are satisfied with the result save the program as normal using the Z command.

NB The program may crash if you get the restart address wrong.

#### 5) IMPORTANT MEMORY LOCATIONS FOR ADVANCED PROGRAMMERS.

The memory locations from \$DC00 to \$DD0F contain a "snap shot" of all the important registers at the instant the program was stopped. They are accessible in the FF memory map (see note 3).

In the current version of the Expert software these are:-

DC00 FLAG 0=NMI 1=RESET  
DC01 ACCUMULATOR  
DC02 X REGISTER  
DC03 Y REGISTER  
DC04 STACK POINTER  
DC05 LOCATION 00  
DC06 LOCATION 01  
DC07 CONTENTS OF VIC CHIP  
DC37 CONTENTS OF SID CHIP  
DC60 CONTENTS OF CIA AT DC00  
DC70 CONTENTS OF CIA AT DD00

#### 6) .Q

This command enables you to move a block of 256 bytes which are used by the system software. The block is normally located at \$D000 to \$D0FF, since this area is not often used by programs. However, any corruption of these bytes by a program which overwrites this area will cause the system to fail. To get round this, it is simple to relocate the block to a 'safe' area using this command. For example, suppose a program that you transferred used the \$D000 to \$D0FF area; before saving it using the Z command, use the monitor to find an unused area of 256 bytes (M command) eg \$D200 to \$D2FF. Then simply type Q, press space then D2 followed by RETURN. This relocates the important 256 bytes to \$D200 - \$D2FF.

You can move this block anywhere within the 64K using this command.

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THE EXPERT CARTRIDGE. AMENDMENTS FOR SOFTWARE VERSION V1.4 16-4-86

THESE AMENDMENTS SHOULD BE READ IN CONJUNCTION WITH THE USER GUIDE.

THE .Q (relocatable system workspace) COMMAND (SEE SECTION 7 & 8).

FURTHER NOTES.

- 1) The system software needs an area of ram of approximately 200 bytes which is used as a workspace during loading back for "uncrunching" the program. The area used is set by default at \$D000, since many programs do not use it.
- 2) Some programs, especially those which use most of the machine's ram, use this area and therefore, to prevent corruption of this area, it is sometimes necessary to relocate the block elsewhere using the Q command.
- 3) We have found that the area from \$0200 to \$02C9 can often be used safely so before saving the program using the Z command, type Q 02
- 4) To find any other unused area, use the M command to "look" through the memory and then type Q nn where nn is the address of the first location (in hex) where the unused area begins and then carry on with step 11. Usually, unused areas contain 00 or FF or some other repeated byte.

NB The area at \$D000 is often used to store the sprite definitions so if you reload and run a program which you have transferred to disk and the sprites seem to be corrupted, then it is likely that you will have to reload from tape and type Q 02 before pressing Z "any name", or find some other free area of least 200 bytes.

To recap; if you find a program that will not run after being saved onto your library disk or one that runs but has corrupted sprites, then reload the program from tape, type Q 02 at the end of step 10, and then carry on with step 11. If this fails to cure the problem, follow the instructions in paragraph 4 above.

IMPORTANT NOTE

THE EXPERT CARTRIDGE TAPE TO DISK SYSTEM IS INTENDED TO ALLOW YOU TO TRANSFER YOUR PROGRAMS TO DISK. HOWEVER, USERS MUST ASCERTAIN FOR THEMSELVES THAT THEY ARE NOT CONTRAVENING THE LAW BY DOING THIS. TRILOGIC DO NOT ACCEPT ANY RESPONSIBILITY WHATSOEVER FOR THE CONSEQUENCES OF THE USE OR MISUSE OF THIS PRODUCT.

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